

NOTES ON SOME CORNISH CIRCLES.<sup>1</sup>

## II.

*The Tregeseal Circles (lat. 50° 8' 25" N.,  
long. 5° 39' 25" W.).*

THERE are two circles situated on Truthwall Common near to Tregeseal and not far from St. Just; the one is nearly to the east of the other, and

ginal structure seems to have contained twenty-eight stones according to Lukis.

My wife and I visited the region in January, 1906, but previously to our going Mr. Horton Bolitho, accompanied by Mr. Thomas, whose knowledge of the local antiquities is very great, had explored the region and taught us what to observe.

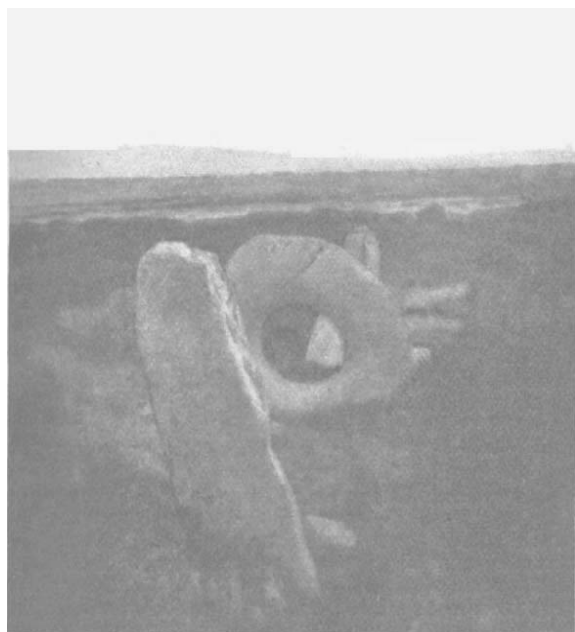
The chief interest appears to lie on the N.E. quad-



FIG. 4.—The Eastern Circle at Tregeseal.

*Photo. by Lady Lockyer.*

there are outstanding stones, including four holed stones, and several barrows. The eastern temple has



*Photo. by Lady Lockyer*

FIG. 5.—The Mén-an-tol.

a diameter of 69 feet, and includes, at the present time, nine erect and four prostrate stones; the ori-

<sup>1</sup> Continued from p. 368.

gant, where, in addition to a famous longstone on a hill about a mile away, the nest of holed stones and several of the barrows are located. Carn Kenidjack, a famous landmark, lies to the north.

Of the two circles, I confined my attention almost exclusively to the eastern one, as the other is in a fragmentary condition, though it is still traceable. It is hidden almost entirely from the eastern circle by a modern hedge.

Mr. Horton Bolitho, who accompanied us in January, has again visited the spot, with Mr. Thomas, for the purpose of further exploration, and determining the angular height of the sky-line along the different alignments, which I have plotted from the 6-inch and 25-inch maps. My readers will therefore see that my part of the work has been a small one, and that they are chiefly indebted to those I have named.

No theodolite survey has as yet been made for determining the azimuths and the height of hills. The following approximate azimuths have been determined by myself from the 25-inch map, and the elevations by Mr. Horton Bolitho by means of a miner's dial.

Alignments	Azimuth	Elevation
Apex of Carn	N. 12 8 E.	4 0
Barrow 800' distant	N. 20 8 E.	3 50
Two barrows 900' distant	N. 50 8 E.	1 50
Holed stones ...	N. 53 20 E.	1 15
Longstone ...	N. 66 38 E.	2 10
Stone ...	N 76 3 E	

The carn referred to in the above table is Carn Kenidjack, called "the hooting cairn." The rocks on the summit, in which there is a remarkable depression, are still by local superstition supposed to emit evil sounds by night.

Of the sight-lines studied so far, those to and from the Longstone and the holed stones seem the most important. The Longstone,<sup>1</sup>  $1\frac{1}{2}$  miles to the N.E., is a monolith 10 feet high on the western side of a hill; it is visible from the circle though furze has grown round and partly hidden it.

The meanings of the various alignments seem to be as follows:—

	Dec. N.	Star	Date
Apex of Carn	42 33 "	Arcturus ...	2330 B.C.
Barrow 800' distant	40 29	" ...	1970 "
Two barrows 900' distant	25 20 21	? Solstitial	
Holed stones	23 2 20	"	
Longstone	16 2	May sun	
Stone	9 15	Pleiades ...	1270 B.C.

Regarding the possible solstitial alignments, the declinations obtained may be neglected until the azimuths and angular heights of the hills have been determined with a good theodolite. A change of  $-10'$  in the angular elevation, and hence about that in the resulting declination, would bring the date given by the barrows to about 2000 B.C.

The position of the Longstone is well worthy of

The May-sun alignment, it may be noted, differs from that from the circle. The heights of hills when determined may give us the same solar declination; that now used gives the declination of the sun for April 28 and August 15 in our present calendar.

Regarding the alignment on Lanyon Quoit, it need only be pointed out that the Pleiades date obtained is some 200 years after the date obtained for the analogous alignment from the circle, showing that if these two monuments—the Tregeseal circle and the Longstone—have any relationship, the removal to the high plain, now known as Woon Gumpus and Boswen Commons, was an afterthought improvement.

I next come to the holed stones, not only the nest of them not far from the circle, but the famous Mên-an-tol itself.

I had heard before going to Tregeseal that the four holed stones shown on the Ordnance map had been knocked down and set up again (not necessarily in their old places) two or three times. Mr. Horton Bolitho and Mr. Thomas, however, in their examination were convinced that the largest of them has

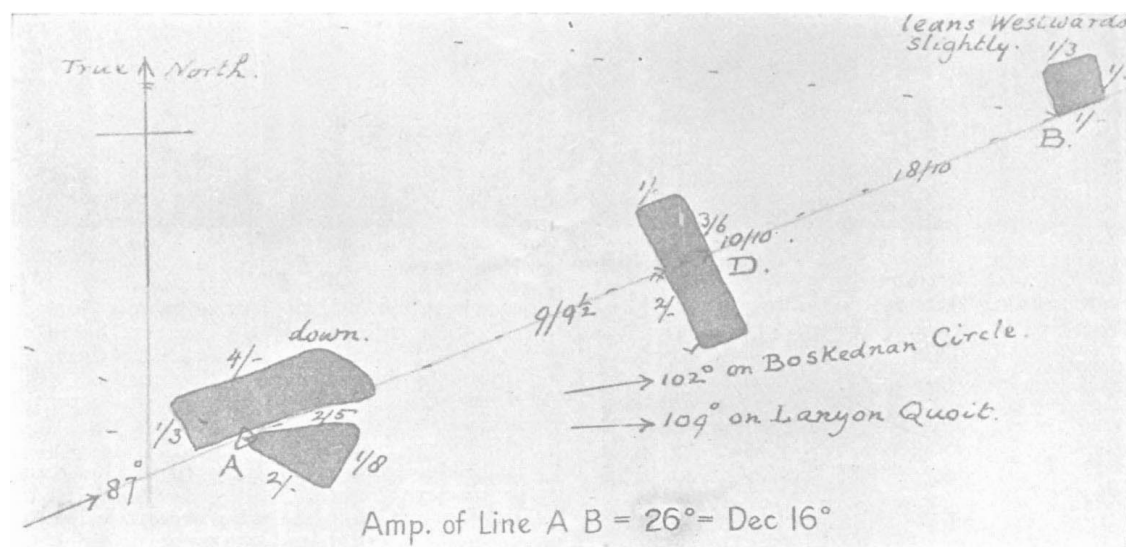


Fig. 6.—Plan of the Mên-an-tol from Lukis, showing that it was an apparatus for observing the sunrise in May and August in one direction and the sunset in February and November in the other. Sun's declination,  $16^{\circ}$  N. or S.

attention. Several very fine monuments which mark the surrounding horizon are visible from it in azimuths with which other monuments have made us familiar. They are as follows:—

Alignment	Az.	Hills
Longstone to Mên-an-tol ...	N. $50^{\circ} 30'$ E.	... $0^{\circ} 34'$
" 9 Maidens (Boskednan) ...	N. $54^{\circ} 0'$ E.	... $1^{\circ} 0'$
" W. Lanyon Quoit N. ...	$67^{\circ} 0'$ E.	... $0^{\circ} 0'$
" Lanyon Quoit N. ...	$72^{\circ} 45'$ E.	... $0^{\circ} 0'$

These values, of which the angular heights of the hills were determined approximately from the contours on the 1-inch Ordnance map, lead us to the following declinations:—

Alignment	Dec.	Star	Date
Longstone to Mên-an-tol	$24^{\circ} 7'$ N.	... Solstitial sun	
Longstone to 9 Maidens (Boskednan) ...	$22^{\circ} 37'$ N.	... Solstitial sun	
Longstone to W. Lanyon Quoit ...	$14^{\circ} 3'$ N.	... May sun	
Longstone to Lanyon Quoit ...	$10^{\circ} 30'$ N.	... Pleiades ...	1030 B.C.

<sup>1</sup> In Cornwall this is the name generally given to a monolith.

never been moved. They also express the belief that the others are not more than a foot or so from their original positions, and that this change is only due to their re-erection by Mr. Cornish after they had fallen down. So far I have heard nothing of the direction of the hole in the stone which retains its original position.

Another interesting matter is that the explorers in question were able to trace an ancient stone alignment from the circle to the holed stones.

I have long held that these holed stones were arrangements for determining an alignment. The famous Odin stone at Stenness, long since disappeared, was, if we may trust the very definite statements made about its position, used to observe the Barnstone in one direction and the chief circle in the other.

The azimuths suggest that theodolite measures may show that the Tregeseal stones might have been used in the same way; they, the Longstone and Lanyon quoit, are in nearly the same straight line, the alignment, holed stones to Longstone and Lanyon quoit, being  $N. 67^{\circ} E.$ , so that the May sunrise may have been noted in this way.

Several other monuments, *e.g.*, Chûn Castle and Cromlech, are to be found in the immediate neighbourhood of the Tregeseal Circle and the Longstone,

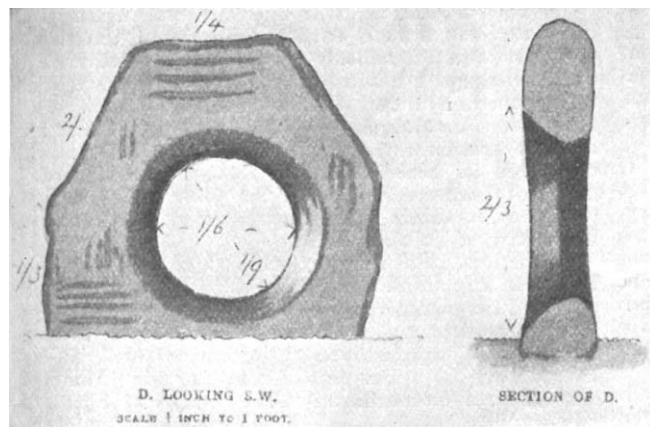


FIG. 7.—The Mên-an to'. Front view and section, from Lukis.

but these will have to await further investigation as to their character and antiquity before any conclusions concerning their astronomical use can be deduced.

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#### IRRIGATION IN THE TRANSVAAL.<sup>1</sup>

THERE are few subjects on which such a great diversity of opinion exists as on the administration of South Africa. Free labour and Chinese labour, the electoral franchise of the Transvaal, the various routes from the interior to the coast, the language to be adopted in Government schools—on these and on many other points one hears well-informed and perfectly honest-minded people asserting, and that with considerable warmth, the most opposite views; views which they maintain are founded on facts.

But there is one subject on which it may be asserted all are agreed, and that is that the great want of South Africa is not gold or diamonds, but water in sufficient volume to be spread over the land when and where it is required. Not that the country is generally devoid of rain, but, as it has been well put, "When rain is wanted it is generally not there; when it is not wanted it is invariably present."

No one was more fully alive to this want than the late distinguished High Commissioner, Lord Milner. He borrowed the services of Sir William Willcocks, one of the most prominent members of the small band of English hydraulic engineers from India who have done so much on the Nile. He further procured two engineers, Messrs. Gordon and Strange, thoroughly trained in the excellent irrigation school of India, to advise, one in the Cape Colony and the other in the Transvaal, upon irrigation matters. Willcocks's tour took place during the war, when he was much hampered by the difficulty of getting about the country. His visit, also, was a short one, but not too short to prevent his submitting a very able report full of thoughtful suggestions. Gordon and Strange went to South Africa after the war. They are there still, and may render invaluable services to the country if the agricultural classes can be made to believe that they have anything to learn, and that there may be advantages in accepting a scheme which requires all

to submit to certain restrictions for the benefit of all, instead of each farmer being free to follow his own devices. A distinguished member of the present Cabinet has remarked that the Boer farmer seems to have a perfect instinct for disobeying the law. Unless he learns to substitute for this instinct the dictates of reason, there is little hope of irrigation flourishing in South Africa.

Besides procuring the services of these officers, Lord Milner shortly before leaving South Africa appointed a commission to report on the legislation required to enable the water resources of the Transvaal and Orange River Colony to be thoroughly utilised, and also on "the precautions necessary in dealing with subterranean water, more especially in areas situated on the dolomite formation, so as to prevent as far as possible the diversion of such water from public streams and fountains to the detriment of the public."

It was directed that an interim report should be submitted as soon as possible on this last subject. This report, dated May 20, 1905, is now before us. The commission consisted of Mr. Justice Wessels, Judge of the Supreme Court of the Transvaal, three other Dutch and two English gentlemen, one of whom was Mr. Strange.

The commission has collected a large mass of interesting information and opinions from thirty-one witnesses, of whom no fewer than nine were professional geologists. South Africa is to be congratulated in possessing so many scientific gentlemen whose evidence was of great value. The other witnesses were principally engineers and farmers. Of the latter there were seven.

In framing an irrigation project the two first questions to ask are generally, How much land is it proposed to irrigate? How much water is available to irrigate it? In all but the most favoured countries the area which it is desired to water far exceeds the volume of water available. In the Transvaal the irrigable area can easily be marked out. It is not so easy to say how much water is at our disposal.

Usually irrigation is practised by canals and water-courses drawn from rivers and lakes, natural or artificial. By careful observation one finds how much water, at the season when irrigation is required, can be drawn from the river or lake. Elsewhere irrigation is practised by pumping water from wells, going down to the water-bearing stratum. Such a stratum is usually found in alluvial plains at no very great depth, and wells may be sunk within a few hundred yards of each other without causing injury by one exhausting the other. The recent Indian Irrigation Commission found that in that country about 13 millions of acres were yearly watered in this way.

The peculiarity of the situation on the dolomite formation of the Transvaal is that the subterranean water tapped by the boring rod is not due to the rain which falls vertically on the surface of the land above, but that the whole of the limestone substratum is pierced by holes and tunnels, flowing streams, and stagnant reservoirs, so that if water be pumped from a well there is no certainty that another well situated ten miles off may not be thereby sucked dry.

Ultimately the water finds its way out to the surface through springs discharging at times more than 50 cubic feet per second. It seems evident that the catchment basins of these subterranean waters do not necessarily correspond with those of the earth's surface above, and the problem of defining their limits and

<sup>1</sup> "Inter-Colonial Irrigation Commission." Interim Report. Pp xxxvii +166. (Pretoria: Government Printing and Stationery Office, 1905.) Price 7s. 6d.